Women's Educational Attainment and their Experiences in Construction Education

Nirooja Thurairajah

Research Institute for the Built and Human Environment, University of Salford

Dilanthi Amaratunga & Richard Haigh

Research Institute for the Built and Human Environment, University of Salford

Abstract

In this modern era as women are becoming more viable and valuable contributors to the management, organisations are indeed realising their importance and increasing their concern with regard to retaining and promoting women. However women's educational level with regard to construction becomes a major barrier for women's career in construction. Although there is a greater awareness regarding construction related professional activities such as engineering and architecture among advanced level students and undergraduates, the status of the industry as a career opportunity does not compare favourably with other options. Frequently it has been noticed that educational segregation leads to occupational segregation.

This study identifies women's educational attainment in the field of construction and explores the difficulties of women students in construction higher education. Further it identifies the initiatives to facilitate women's access to higher education. This study has been based on an analysis of theoretical and practical ideas obtained through a comprehensive literature review with the hope that it will help human resource practitioners in developing women's careers towards the management of construction organisations and to facilitate women's future prospects.

Keywords: Education, Construction industry, Women

Introduction

Over the years women's role in workplace and their employability are changing in many countries and in the UK just over 13 million women are employed which accounts for 49.9% of the total workforce (CITB 2006). However the construction industry which is one of the significant industries of the UK economy constitutes only 12% of female workforce. The construction industry is a mostly male dominated industry after mining and quarrying where no women are employed. According to Labour Force Survey Spring report (2001 cited CITB 2003) women represented in following percentages for different positions in the construction industry: Manual work 6%; Sales 9%; Clerical and Secretarial 63%; Manager and Administration 13%; Professional and Technical 9%. These figures exhibit the greater degree of vertical occupational segregation in the construction industry. That is the representation of women in managerial level and bottom level in an organisation's hierarchy is highly skewed. In addition it was found that the proportions of women in management, professional, and sales jobs within the construction Industry are far below the national average.

Mills and Ayre (2003) found from previous research that increasing the representation of women in the engineering workforce is desirable for reasons such as: recognition that diversity in the labour force is to the advantage of the industry; social justice considerations for women; it brings in new talents, and provides access to wider markets and to overcome labour shortages. The entry into the construction industry can be via crafts and trades, higher education and/or professional qualifications. However, in almost all routes there is the stipulation that candidates should have formal qualifications in subjects such as mathematics, science and technical drawing. It was found that women educational attainment in these fields of study is far below than male students' achievement. Therefore construction educational institutions need to play their role by promoting the construction industry as a worthwhile career choice for women by taking actions to identify the barriers confronting them in choosing or continuing this field of study for a career in construction the field without leaving in the middle.

This study identifies the position of women's educational and professional attainment related to the field of construction within the industry and the status of female students in construction related higher education. Further it explores the difficulties faced by women students in construction higher education and identifies the initiatives to facilitate women's access to higher education. This study has been based on a theoretical and practical knowledge obtained through a comprehensive literature review. It is hoped that the research will serve to raise the concern for an improved access and retention of girls in the study of science, engineering and technology in higher education in order to raise the status of women in professional capacity in the construction industry.

Women and their educational attainment in the field of construction

The powerful cultural images of the construction industry have assisted the occupational segregation whereby construction related professions have been perceived as unsuitable for women. The UK government has introduced initiatives to encourage women to pursue

construction related degree courses in order to fulfil the skills shortages in technological expertise. While such programmes have had some success in increasing the proportion of women studying engineering, there has not been a proportionate increase in the number of women engineering professionals (Powell *et al*. 2004). The research by Harris (1989) found that though there is a greater awareness regarding construction related professional activities such as engineering and architecture among advanced level students and undergraduates, the status of the industry as a career opportunity does not compare favourably with other options. The poor image of construction, lack of role models and knowledge, poor careers advice, gender-biased recruitment, peer pressure and poor educational experiences are all been cited as militating factors against women's entry in to the industry (Gale and Skitmore 1990; Coles 1992; Johnson et al. 1992; Srivastava 1992; Bronzini *et al*. 1995; Wall 1997 cited Dainty *et al*. 2000).

Field segregation between male and female students in further education and higher education are almost as extreme. In engineering and technology field, 87% of further education students and 86% of higher education students are male. During the year 2003/2004 female students account for only 14% of engineering and technology under higher education and during year 2004/2005 13 % for engineering, technology and manufacturing and 5% for construction under further education (EOC 2006). Frequently it has been noticed that educational segregation leads to occupational segregation. Women tend to be concentrated in health and social work (79%) and education (73%), whereas men tend to be concentrated in construction (87%), transport, storage and communication (90%) and transport, storage and communication (76%) (Labour Force Survey Spring 2005 dataset cited EOC 2006). This reflects that construction continues to be the most male dominated even though women's employment within the industry has risen over the past decade.

According to the Professional Services Survey 2001/2002 the profile of male and female employment (cited Construction Industry Council 2004) shows the female employment profile within the sector is dominated by those providing non-construction related, clerical and administrative support and 55% of all women within the sector are employed in such positions. 20% of all women in the construction professional sector are full members of the professional institutions and a further 17% are qualified to Higher National Certificate (HNC) level or higher. As per the profile of male employment, 46% of all male in construction professional sector are full members of the professional institutions and 27% are qualified to Higher National Certificate (HNC) level or higher.

Table 1 Membership of the Built Environment Professions

Professional body	Total membership	Women members	Percentage of women members
Royal Institution of Chartered Surveyors	107,817	11,173	10%
Institution of Civil Engineers	78,641	3,678	5%
Chartered Institute of Building	37,511	1,181	3%
Royal Institute of British Architects	28,328	2,858	10%
Institution of Structural Engineers	20,173	9,50	5%
Royal Town Planning Institute	17,924	4,714	26%
Total	290,394	24,554	8%

Source: Watts, 2003 cited Greed, 2006

Table 1 reflects the under- representation of women professionals in the built environment institutions compared to male members. This results in lack of professional qualifications for women to develop their career. In addition it is apparent from the above women's memberships in different professional bodies of built and human environment (8%) that women's career development towards the strategic positions is limited.

Difficulties encountered by female students in construction education

Earlier studies have shown that society in general and girls in particular, consider science as a male domain. Further women considered science, engineering and technology subjects as either too mechanical or too technical for girls (Quaisie, 1996). In addition girls are also considered as not being able to think or work scientifically and technical subjects are considered suitable for boys only and girls who study them are considered un-ladylike. In addition science and mathematics textbooks, classroom languages, examples, charts and models portray the male image of science. Over the years those who attempt to cross the gender barrier face several odds and only a few bold ones manage to succeed. The resultant effect of this problem is the apparent vast areas of job opportunities which seem to be available for men and very limited opportunities for women. Furthermore in certain countries due to the misconceptions held by the society and which girls also believe in like the traditional role of the women performed in the home, girls are encouraged to study certain subjects in school such as cooking and needlework to make them more capable of bringing up children, performing household chores (Quaisie, 1996).

Research suggests that gender-based expectations concerning career choices develop as early as elementary school. Male and female differences also are evident in access to higher education and thus to career choices. McWhirter (1997 cited Stroh and Reily, 1999) found significant gender differences in perceived barriers to education and careers among a large ethnically diverse sample of male and female high school students. Mills and Ayre (2003) suggest that there have been a number of findings that many women experience a 'chilly

climate' in science, engineering, and technology courses, and it is likely that other minority groups share similar experiences. Unhappy or uncomfortable students will not achieve as well as they might in a more supportive environment, and they may even resign from the course. Some of the features of the chilly climate that have been identified from previous studies are,

- Erroneous assumptions by lecturers that all students have prior tinkering experience specially with regard to practical familiarity with mechanical and electrical devices and appliances has been a major obstacle in understanding the technological subjects (Lewis, 1995).
- Lack of excitement in the content or presentation of the course (Nair & Majetich, 1995)
- Apparent lack of relevance in the curriculum content (Lewis, 1995; Lintern, 1995)
- Teaching methods that are appropriate for only a very limited range of learning styles (Lewis, 1995; Jolly, 1996)
- Disruptive behaviour of majority groups (e.g. white male students throwing paper planes) Lintern 1995; Jolly 1996), and
- Classroom atmosphere is uncomfortable for some students because of racism, sexism, or similar attitudes (Lewis, 1995; Lintern 1995; Jolly 1996; McLean *et al*, 1997).

Lack of role models and a few women teachers in science and Mathematics become a barrier to female students. Throughout their lives, girls are taught mainly by male teachers, therefore science and mathematics are perceived as male subjects. Due to the lesser number of women in the field of science and technology girls seem to have no role models to look up to or no one to identify with and no one to serve as a mentor. Court and Moralee's (1995) investigation into gender issues in the building professions, revealed that almost half of the female construction students surveyed said that their decision to enter the industry were influenced by family or friends already in the industry, with 34 percent being influenced by contacts already in the industry. The majority of respondents on building-related courses were happy with their course content, with only a minority wishing to see more women students and lecturers on their courses.

Furthermore, according to Dainty *et al*.(1999) the construction higher education which for most formed the interface between career choice and working in the industry, was found to have provided a sheltered environment, and to have presented a sanitised view of the realities of working life in the sector. These factors resulted in younger women becoming disillusioned with the reality of career opportunities, and in many seeking alternative positions outside of the industry as a result. In contrast, mature women and the majority of men in the sample had not been subject to such recruitment initiatives. They were more likely to have gained an insight into the realities of the industry by a friend or family member, and did not experience the same disappointment with the opportunities available to them once they had entered it (Dainty *et al*. 1999).

Industrial placement functions as a type of internship for students as they near the end of their degree studies in the UK. In a recent research it was found that women students had identified engineering degrees as a good basis for a variety of career paths. Indeed, students of both sexes were critical of both the content and the emphasis on theory in their college courses, and said that they wanted a more practical curriculum relevant to the working world. Those students had difficulty adjusting to the practicalities and routines of work as well as to the workplace culture. It was suggested to include industrial placements in order to ease this process, and help women engineering students to make choices about their careers (Bagilhole cited Thilmany, 2007).

Discussion

There are a number of factors which affect women's career choices such as the industry's attitude towards women, job prospects and career aspirations (Bennett *et al*. 1999). According to Srivastava (1992) this results in a large pool of women who lack the necessary qualifications for the construction industry because they have opted out so early in their lives. However the problem with construction industry's image can make both men and women, uninterested in the industry. As women's career choices are also influenced by family background factors, it is not surprising that those women who opt for non-traditional professions often have a strong role model who works in the industry.

According to McIllwee and Robinson (1992), though construction higher education values women's achievement in academic work, the construction industry work place cultures value such masculine strengths as a fascination with technology, expertise as a tinkerer, and an aggressive style of self-presentation. Further they state that it is important for women's success to know how to conform to the masculine culture and carry out the task accordingly in the work place. However, this becomes an issue when women make the transition from education to work since women engineers not only have to show competency in their knowledge and skills but also have to learn to perform and enact masculine norms of attitude and interaction in the work place.

The UK educational system still fosters a gendered route through education, which results in material differences between boys and girls in terms of their educational qualification. (Fielden *et al*. 2000) At GCSE level girls perform better than boys, but are significantly less likely to take subjects such as mathematics, physics and computer studies. This means that women's access to construction related higher level courses, which require such qualifications may be substantially reduced. In addition though there are access courses available at colleges, which provide the equivalent of advanced levels for entry into degree courses without no formal qualifications requirements they do state that a background in mathematics, science and technical drawing is considered useful, qualifications which girls/women are less likely to have. This shows that women's opportunities for entry into the construction industry at a professional level seriously undermined. According to Quaisie (1996), outmoded misconceptions and stereotyped attitudes are the major factors contributing to the negative attitudes on the part of girls towards the study of science. In spite of the fact that fewer girls than boys do take up the study of mathematics and science at

higher levels in school, the few who do persist in the study of these are found to do very well in them, excelling in many cases and even performing better than boys in certain cases.

In addition many aspects of construction higher education culture are analogous to that which exists in the construction workplace. Although this does not actively deter women from pursuing careers in their chosen profession, women students are not completely satisfied with the structural and cultural areas of construction higher education (Powell *et al*. 2004). This affects the future entry of women into the construction related higher education. Mills and Ayre (2003) suggest that there have been a number of findings that many women experience a 'chilly climate' in science, engineering and technology courses, and it is likely that other minority groups share similar experiences. According to Powell *et al*. (2004) although women are attracted to engineering, their experiences in higher education discourage them from pursuing their chosen career path. Although many initiatives have been taken to overcome the above situation, the signs of gender segregation by job area continue (Bennet *et al*. 1999). Further although the numbers of women studying engineering have increased in the UK many of them use it as a launch base for a variety of other careers. This shows that although women are attracted to engineering, their experience of engineering in higher education discourages them from pursuing their chosen career path. If proper measures can be taken, the present obstacles of women, lack of educational qualifications and technical competencies can be overcome and they could move up in their career ladder. Therefore the educational institutions should take actions to promote and retain more female students and motivate them pursue their careers in the field of construction

Initiatives for an improved access to construction education

In order to attract and retain more women into the sector the construction higher education needs to review its structure, culture, practices and curriculum. Srivastava (1996) recommended a need for radical change in construction higher education. She maintains that such changes may involve presenting construction disciplines in a social context; considering practical applications; integrating modules from social sciences and humanities; questioning assumptions, traditions and the culture of construction education and practice; relating topics to a range of student experiences; addressing the social and environmental impact and benefits of construction; incorporating interactive, qualitative, critical and ethical considerations in projects; and mentoring of students and staff who are in a minority.

She further stated that language and examples used in construction course content are important conveyors of culture and values and should not be exclusionary, sexist, ethnocentric or homophobic. She also suggested that feminist perceptions of science and technology should be incorporated into the construction curriculum, to facilitate questioning of assumptions, and challenge conservatism and traditionalism in the construction curriculum. There should be further easing of professional bodies' influence on construction course design and content and more autonomy given to construction tutors to make space in the curriculum for new and more relevant areas, and also for independent study, reflection, discussion and debate.

Sensitising the community through groups especially women associations and religious groups about the importance of girls' education in the sciences and mathematics from secondary levels of education will assist to improve enrolment and subsequent performance of girls in the study of engineering and technology related subjects. Further by taking more effort to deal with misconceptions about what science is and the role of girls in the society and providing financial support to their education to continue their studies will increase the number of women students. In addition local scholarships can be given as incentives for girls who excel in the sciences and mathematics to promote more women into the field. Furthermore the girls can visit institutions of higher learning in sciences for a better understanding of the various subject areas. They also can visit industries and scientific research institutions to acquaint themselves with the various job opportunities that exist there. Such visits also may offer the girls the chance to experience some of the problems one may encounter by working in male-dominated areas, thus making them aware of what they need to do and what they should expect.

According to Madhill *et al*. (2003) without the opportunity for hands-on learning, students report that they do not automatically appreciate the application of what they are studying to their personal aspirations and the things they care about. Further while providing the training or practical experiments the educational institutions should consider about the physical environment for example the height at which instruments are kept so that it can be accessible to women as well. Most importantly special orientation should be provided to teachers with the view to minimise gender bias in the classroom by using teaching approaches which make science and mathematics appeal to girls. Mills and Ayre (2003) emphasise the desirability of structuring an engineering curriculum around a general recognition that students from diverse backgrounds bring different perspectives, attitudes and values to the engineering classroom, without making distinctions between the specific cultural groups represented in the class. This was supported by Sagebiel (2003), who also suggested that an improved curriculum would make both the climate and content of teaching appropriate to attract and retain both men and women.

Weiss et al. (1990 cited Powell *et al*. 2004) claims that teaching and assessment materials which are familiar and relevant to women including the ethical, human and social context of science and technology should be incorporated into the curriculum. In addition to above Hodgson (1993) also suggests for interdisciplinary courses, for example the use of social science, health, environmental and philosophical concepts, processes and problems in science and technology courses.

According to Laskowski (2006) the positive reinforcement is important to self-esteem and performance. If women are repeatedly told, starting at a young age, that they are not as intelligent as their male classmates, they'll start to believe it and not try to compete. Positive reinforcement and stressing there are no differences between male and female scholarly performance is the best way to encourage everyone. Furthermore they pointed out that without a commitment to equal opportunities, women's entry into, and retention within building is unlikely to be redressed. They found that responses relating to ways of encouraging women to remain in the building industry, showed a clear preference for three

kinds of actions. The most highly ranked action was enabling women to combine work and family life by introducing or improving flexible practices, childcare, and career-break schemes. Three quarters of the women felt that a commitment to, and action to ensure, equal opportunities from senior managers in respect of selection, promotion, advertising and training would be very or extremely effective. A total of 70 percent identified the third highest action as integrating women into the building professions, by offering support to women entering the industry and raising the profile of successful women.

Conclusions

Modern economy increasingly demands more high skilled and better educated workers than ever before. While more women are working in construction than before, many do not have the skills necessary to obtain the high wage jobs needed to adequately support themselves and their families. Therefore it is important to recognise that career and education are increasingly important for women and girls seeking to earn their way in a competitive marketplace. In order to achieve economic self sufficiency women must have access to education, training and support for success in the work force. Therefore educational institutions must work to strengthen educational programs to improve postsecondary education access, career development and earning potential. Importantly female students should be educated regarding construction from their secondary level with better understanding. Since education is only one of the many variables that affect occupational choice and many of these variables may influenced by gender the society should be made aware of the advantages women can make by proper education and the view that science and technology related school subjects are foreign, unrelated to our environment must be changed.

Research findings indicate that while women are not deterred from pursuing their chosen engineering career, the culture and structure of the engineering education system has been designed for a male audience. This suggests that engineering higher education does not benefit most female students to the same extent as male students. Therefore an inclusive approach not only assists the progress of socially and culturally underrepresented students, but it will also broaden the perspectives of all students, and thus improve the overall quality of an engineering program. The most important and enduring concern of higher construction related educational institutions relating to diversity is to improve the recruitment and retention of female initially as students but ultimately for employment in the construction professions.

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